# United States Patent [19]

**Burke et al.**

[11] **3,728,184**

[45] **Apr. 17, 1973**


[54] **METHOD OF MAKING SYRINGE AND NEEDLE ADAPTER ASSEMBLY BY ULTRASONIC BONDING**


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[73] Assignee: **Burron Medical Products, Inc.,** Bethlehem, Pa.



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[21] Appl. No.: **175,310**

**Related U.S. Application Data**

[62] Division of Ser. No. 32,789, April 29, 1970, Pat. No. 3,638,650.

[52] **U.S. Cl.** ..... **156/73**

[51] **Int. Cl.** ..... **B29c 27/08**

[58] **Field of Search** ..... 156/73



[56] **References Cited**

UNITED STATES PATENTS

3,047,942 8/1962 Schneider et al. ..... 156/73

3,224,916 12/1965 Soloff et al. ..... 156/73

OTHER PUBLICATIONS

Designing Plastic Parts for Ultrasonic Assembly, Machine Design, March 16, 1967.



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[57] **ABSTRACT**

A needle adapter is supported in surrounding relationship to the boss on a syringe and has attaching portions to mount a hypodermic needle having attaching flanges on the hub thereof. The needle adapter includes a plurality of tapered spaced portions which are ultrasonically fused to spaced portions of the annular shoulder on the barrel of the syringe surrounding a boss extending therefrom.


**2 Claims, 5 Drawing Figures**

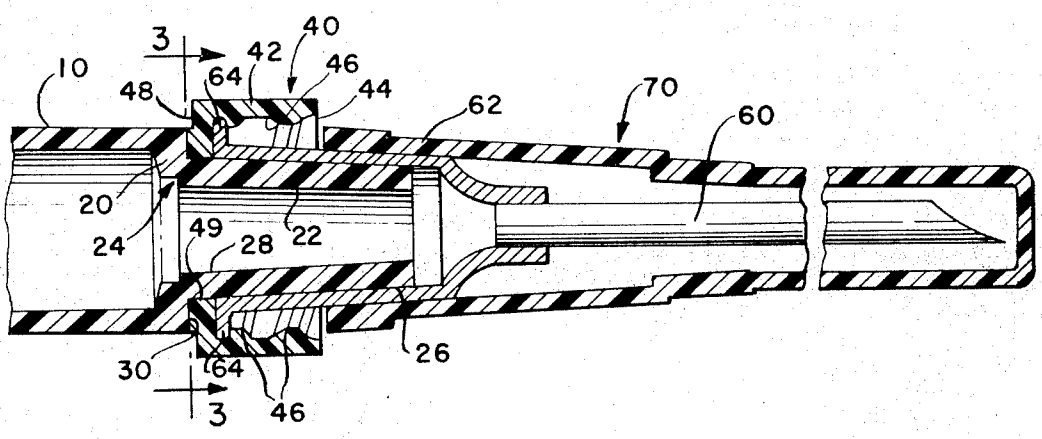


FIG. 1.

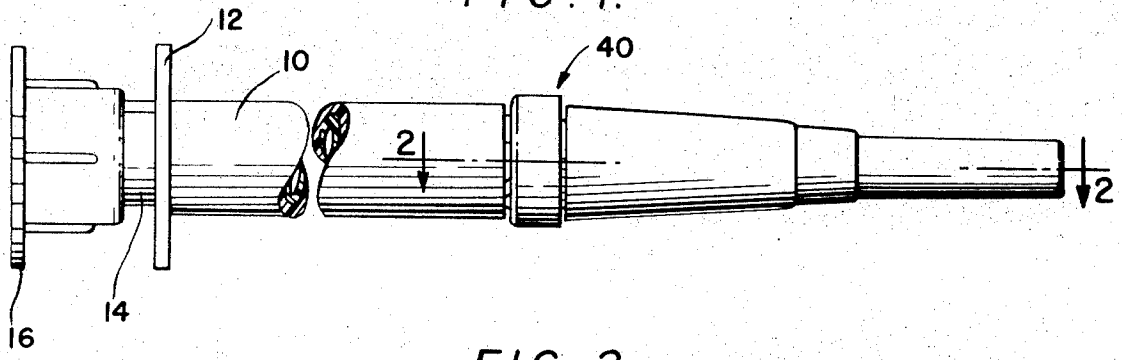



FIG. 2.

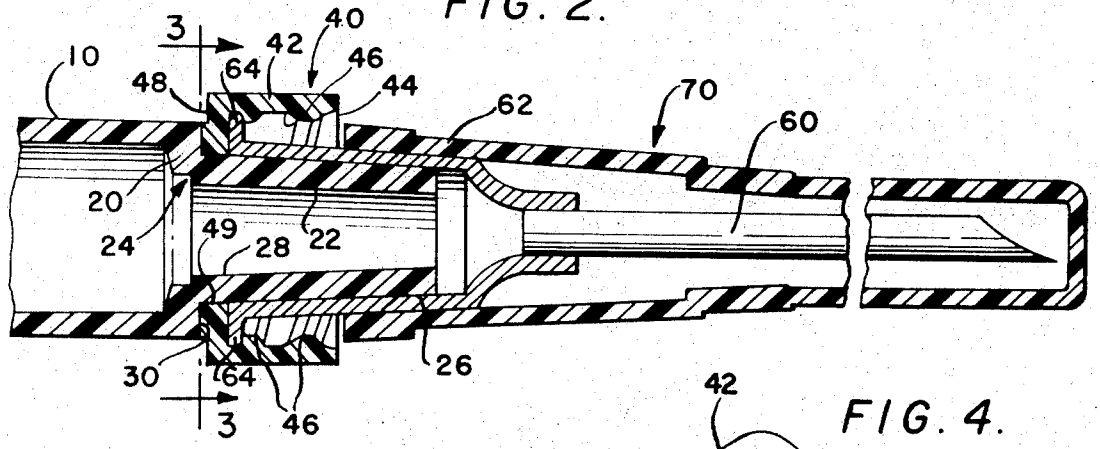



FIG. 3.

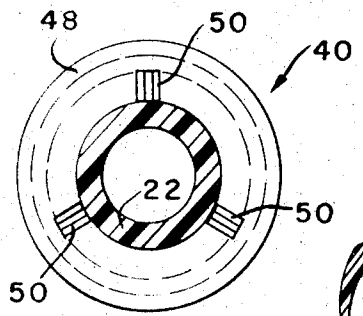



FIG. 4.

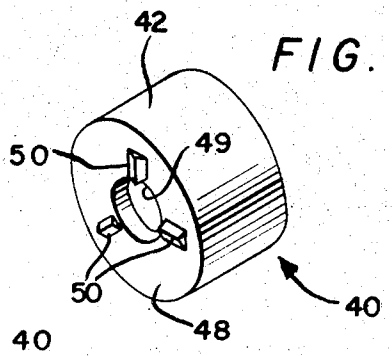
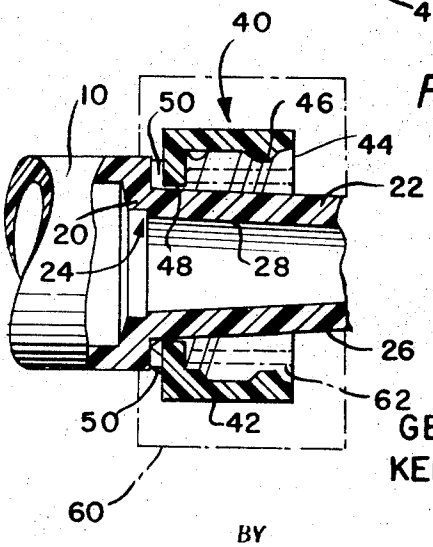



FIG. 5.




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# METHOD OF MAKING SYRINGE AND NEEDLE ADAPTER ASSEMBLY BY ULTRASONIC BONDING

This application is a divisional application of copending application Ser. No. 32,789, filed Apr. 29, 1970, now U.S. Pat. No. 3,638,650 entitled SYRINGE AND NEEDLE ADAPTER ASSEMBLY AND METHOD OF MAKING SAME.

## BACKGROUND OF THE INVENTION

The present invention relates to a syringe as used in the medical field and wherein the syringe is to be connected with a hypodermic needle having conventional attaching flanges thereon.

Syringes are generally provided with a boss extending from the end thereof having a Luer taper on the outer surface thereof for receiving the hub portion of a hypodermic needle having a cooperating taper formed therein. It is additionally desirable to provide threaded adapter means cooperating with the attaching flanges on the hypodermic needle for holding the hypodermic needle in place on the boss of the syringe.

On relatively large syringes, the threaded adapter means can be molded on the syringe itself. It is not, however, feasible to mold such threaded adapter means on smaller syringes of reduced diameter.

The present invention is particularly directed to a syringe and adapter assembly wherein both the syringe and adapter are formed of plastic and comprise a throwaway item which is manufactured in an economical manner so as to reduce the cost to a minimum. It is, accordingly, a particular objective of the present invention to provide a syringe and needle adapter assembly as well as a method of making same wherein the assembly can be manufactured at a minimum cost. The completed product provides an assembly wherein the needle adapter is positively held in operative position in use and cannot work loose with respect to the associated syringe.

## SUMMARY OF THE INVENTION

The needle adapter of the present invention is of tubular construction and is disposed in surrounding relationship to a boss extending longitudinally of the syringe barrel. This adapter includes attaching portions therein which cooperate with the flanges on an associated hypodermic needle to hold the needle in place.

The needle adapter includes a plurality of spaced tapered portions extending therefrom which are connected to spaced portions of an annular shoulder formed on the syringe in surrounding relationship to a boss extending therefrom. These spaced portions of the needle adapter are fused to the syringe so as to firmly and positively hold the needle adapter in operative position.

In the method of the present invention, the needle adapter is secured to the syringe barrel by ultrasonically heating and fusing the spaced projecting portions on the needle adapter to the syringe barrel while simultaneously applying pressure to the needle adapter to urge the projecting portions thereof into contact with the syringe barrel.



## BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is an elevation, partly broken away, of a syringe and needle adapter assembly according to the present invention;

FIG. 2 is a sectional view on an enlarged scale taken substantially along line 2—2 of FIG. 1, looking in the direction of the arrows;

FIG. 3 is a sectional view taken substantially along line 3—3 of FIG. 2, looking in the direction of the arrows;

FIG. 4 is a top perspective view of the needle adapter according to the present invention; and

FIG. 5 schematically illustrates the manner in which the needle adapter is connected to the syringe according to the method of the present invention.

## DESCRIPTION OF THE PREFERRED EMBODIMENT

Referring now to the drawings wherein like reference characters designate corresponding parts throughout the several views, a syringe includes a main body portion or barrel **10** of substantially cylindrical hollow construction. This barrel is formed of polypropylene or similar material which may be transparent and provided with indicia thereon in the usual manner. A radially extending flange **12** is provided circumferentially about the open end of the barrel. A plunger **14** of substantially cylindrical hollow construction is slidably disposed within the barrel and has an enlarged end portion **16** adapted to be manually engaged by the thumb for operating the plunger in the usual manner.

As seen in FIG. 2, the barrel includes an end wall **20** which is interconnected with a longitudinally extending boss **22** through the intermediary of a frangible portion **24** which may be of a construction similar to that shown in U.S. Pat. No. 3,306,291, which permits the boss and a needle mounted thereon to be broken away from the barrel after the assembly has been used. The boss is provided with a tapered outer surface **26** having a conventional Luer taper. A bore **28** extends longitudinally through the boss. The end of the barrel defines an annular shoulder **30** extending around boss **22**.

The needle adapter of the present invention is indicated by reference numeral **40** and may be formed of a material similar to the syringe, such as polypropylene and the like. The needle adapter includes a generally cylindrical body portion **42** having an open end **44** and is provided with a pair of attaching portions **46** defining a double thread within the bore of the needle adapter. Each of attaching portions **46** extends through an arc of approximately 180° and is sloped so as to define a substantially helical configuration. These attaching portions cooperate with the attaching flanges on the hub of a hypodermic needle so as to draw the hub of a needle into operative position when the needle is rotated with respect to the needle adapter.

The opposite end of the needle adapter is provided with an annular radially inwardly extending flange **48** having a central hole **49** formed therethrough which receives the boss on the syringe. A plurality of spaced portions **50** extend from flange **48**, these portions **50** being shown as three in number. It should be understood that the number of projecting portions can be increased, although it is considered preferable to have

only three or four such projections so as to minimize the amount of area on the syringe to which the needle adapter is connected. Projections **50** are of tapered configuration terminating in an outer relatively sharp edge for a purpose hereinafter described.

Referring now to FIG. **5**, the manner in which the needle adapter is connected to the syringe is illustrated. An ultrasonic heating means is indicated schematically by reference character **60**, and members **62** are adapted to engage the inner face of flange **48** of the needle adapter for applying pressure thereto.

When it is desired to connect the needle adapter to the syringe, the needle adapter is first disposed in the position shown in FIG. **5** in surrounding relationship to the boss formed on the syringe. The ultrasonic heating means is then disposed so as to ultrasonically heat the assembly while simultaneously applying pressure to the left as seen in FIG. **5** so as to urge the needle adapter into contact with the syringe.

The tapered projecting portions **50** formed on the needle adapter will serve as energy directors so as to concentrate the ultrasonic energy and the heat produced at the outer edges of these projections, thereby causing the projections to be fused to the adjacent portions of the annular shoulder formed on the barrel of the syringe. As the projecting portions are fused to the shoulder of the syringe, pressure is applied to the needle adapter causing the projecting portions to be somewhat flattened at the outer tapered edges thereof, thereby reducing the longitudinal dimension of these projecting portions substantially in half in the completed assembly as seen, for example, in FIGS. **1** and **2**.

The needle adapter is, accordingly, ultrasonically heated and fused only to spaced portions of the annular shoulder on the barrel in the final configuration of the assembly. It is desirable to provide areas of connection between the needle adapter and the syringe of relatively small dimensions so that such areas comprise a minor portion of the area of the annular shoulder. This insures that the annular shoulder on the syringe and the adjacent frangible portion **24** are not deformed during the method of making the assembly and, furthermore, by providing only spaced areas of interconnection between the syringe and the needle adapter, the frangible portion is not reinforced to any substantial degree so that this frangible portion can still be readily broken after the assembly has been used.

While the needle adapter has been disclosed as being heat fused to the syringe, it should be understood that the needle adapter could also be connected at spaced portions thereof to the syringe by an adhesive substance or the like.

The adapter can, of course, be color coded by molding the adapter of different colored plastic, the color used corresponding to a particular size needle attached to the syringe.

A hypodermic needle includes a cannula **63** interconnected with a hub portion **64** having an internal bore complementary to the outer surface of boss **28** on the syringe. The hub portion includes a pair of radially outwardly diametrically oppositely disposed attaching flanges **65** which cooperate with the attaching portions of the needle adapter to draw the hypodermic needle into operative position and hold the needle on the boss of the syringe.

A conventional needle guard **70** fits snugly about the hub portion of the needle so as to protect the outer sharpened end portion of the cannula until the syringe is to be used.

As this invention may be embodied in several forms without departing from the spirit or essential characteristics thereof, the present embodiment is therefore illustrative and not restrictive.

What is claimed is:

**1**. The method of joining a tubular plastic needle adapter to an annular, axially facing shoulder on a plastic syringe barrel to form a syringe and needle adapter assembly, including the steps of forming at least three equally circumferentially spaced apart, tapered, rearwardly axially projecting, radially extending energy directing ribs on the needle adapter, positioning the adapter with the ribs in engagement with the annular shoulder on the syringe barrel, and applying ultrasonic energy to the adapter and syringe barrel to ultrasonically heat and fuse the adapter to the syringe barrel at only the energy directing ribs, said ultrasonic energy deforming said ribs and reducing the axially projecting dimension thereof by approximately one half, so that the adapter and syringe barrel are not deformed during assembly thereof and so that the adapter is spaced from said syringe barrel over a major portion thereof and may be readily broken from the syringe barrel when desired.

**2**. The method as defined in claim **1**, including the step of simultaneously applying pressure to the needle adapter to force said spaced portions toward said shoulder while said spaced portions are ultrasonically heated.

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